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ABSTRACT

The fact sheet presents information on science laboratory and classroom access for disabled persons. Suggestions are directed to the high school and postsecondary student, the instructor, and the administrator. Examples are given of disabled scientists, approaches used in various science settings, and disabled students using adapted equipment. Accommodations are listed for students with hearing impairments (such as interpreters, notetakers, visual aids, and decoders), learning disabled students (including textbooks on cassette tape), mobility impaired students (such as portable science stations, adapted safety equipment, and variable height wheelchairs), visually impaired students (including a talking calculator, tactile models, and emphasis on verbal description), and vocally and speech impaired students. The resource section lists and summarizes 29 publications, agencies, and organizations with information on the topic. (CL)

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Higher Education and the Handicapped Resource Center — a national clearinghouse on postsecondary education for disabled people • One Dupont Circle, N.W., Washington, D.C. 20036 •

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ACCESS TO THE SCIENCE LABORATORY AND CLASSROOM

INTRODUCTION

The accomplishments of over 1000 working scientists with disabilities and the historic contributions of such disabled scientists as Albert Einstein, Charles Steinmetz and Thomas Edison, attest to individual strategies for overcoming barriers in the laboratory and science classroom. Accessible labs and classrooms have begun springing up across the country making the pursuit of education and careers in laboratory sciences a completely viable option for interested disabled students. There are now many acceptable, cost-effective ways to make laboratories and science classrooms accessible.

This fact sheet presents resources and references concerning laboratory and classroom access for disabled people in the field of science. This information has been prepared to encourage high school and postsecondary students, faculty members and administrators to recognize the problems, solutions and rewards of providing laboratory access. Concrete examples and cost-effective suggestions provide a wide range of methods for making laboratories and science classrooms accessible.

FOR THE STUDENT

If you are interested in and have an aptitude for science, you will in all likelihood be able to pursue your interest. Due to your disability, you may require some unique accommodations and services, and you will most likely develop your own coping strategies, but your goal is obtainable. The university population is at an all-time high. Disabled students are also taking advantage of the opportunities available to them in postsecondary education. Many disabled students have successfully completed degrees in the sciences.

Your first step is to explore the options in your educational career, with the courses of study available. Be aware of prerequisites and how programs may differ from one college or university to the next. By using such knowledge, you will be better able to plan accordingly. Choosing a science field means recognizing your needs as they relate to your studies or career, planning ahead, informing instructors and colleagues when necessary, and retaining a sense of determination.

The American Association for the Advancement of Science (see the RESOURCES section) has a register of more than 1000 disabled scientists, of all disciplines and disabilities. These scientists are willing and available to share information and coping strategies by phone or letter. As professionals, these people may also be able to suggest the most appropriate science and lab courses suited to your field.

The AAAS is only one resource of many. Yes are probably your best resource. Think about your needs and how you have accomodated your disability in the past. Look at the lab facilities. Are there difficulties with its use? How could the facilities be modified to meet your needs? Discuss your needs with your instructors. They know the coursework and may be a help in planning ahead. A counselor, a disabled student service coordinator, a disabled student services coordinator can be of assistance; at each level disabled students who have dealt with similar problems can be called upon for advice and strategies.

good resources as they may have developed a coping strategy that would also work for you. Be aware of the people available to assist you (see the RESOURCES section), but don't let discouraging advice stop you. If you don't know or are not sure of something—ASK! In essence, leave no rock unturned.

Of great importance is the coordination and interaction of those people supporting you. Introduce your instructor to your counselor or advisor, introduce your vocational rehabilitation counselor to the disabled student service officer. Finally, as you and your supporters begin developing strategies, be realistic and flexible in the solutions. Keep cost in mind, but remember you have a right to an accessible education.

FOR THE INSTRUCTOR

Instructors should be aware of the needs of disabled students in their programs to teach them effectively. In most educational institutions there are people with experience in making adaptations with which you can work: in junior high and high schools, a special education resource teacher may help; at a college or university, a disabled student services coordinator can be of assistance; at each level disabled students who have dealt with similar problems can be called upon for advice and strategies.

Instructors have found that
- providing audio versions of printed texts, exams, and notes for the visually impaired student;
- allowing hearing impaired or deaf students extra time for completing lab assignments;

• bearing the needs of the disabled individual in mind when assigning lab partners and encouraging disabled students to participate

• distributing syllabi, assignments and other relevant course material as far in advance as possible, so that the disabled student can acquire texts on tape or make other preparations

Non-disabled students as well will benefit from such additional information as audio description intended for visually impaired students, or visual description intended for hearing impaired students. *Waiving lab requirements or other assignments is never an acceptable solution.*

Additional information on specific program adjustments that have been used successfully is available from the American Association for the Advancement of Science. People are encouraged to call or write with specific questions and to share successful adaptations. Using these resources as background, solutions can be worked out with the disabled individual to construct the most satisfactory arrangement for all concerned.

FOR THE ADMINISTRATOR

Making your school's laboratory accessible is an investment that pays off each time a disabled student has the kind of hands-on experience critical to the study of science. Furthermore, once one lab station has been made accessible it may be used as is, or with some modification, by many students for years to come. Making a laboratory accessible need not be costly, particularly if the disabled individual(s) involved are consulted and a sensible approach is taken to meet their needs. For example, rather than lowering stationary lab equipment to meet the needs of a student who uses a wheelchair, in many cases one may be able to raise the wheelchair and the student to the appropriate height. Such a wheelchair could be purchased by the department so that it is available for use by other mobility impaired students when appropriate. Strategies you develop to accommodate the needs of hearing impaired, visually impaired or learning disabled students may be repeatedly used as well.

Most campuses have established a committee to assure compliance with the Rehabilitation Act of 1973. Section 504 requires recipients of Federal funds not to discriminate against people because of disability. Access to science labs for qualified people with disabilities is necessary. The typical Campus Access Committee develops policies and procedures which can assure access. The committee is composed of a variety of campus and community representatives, and is an excellent resource when planning for science lab access (see "Cost Effective Ideas" in the **RESOURCES** section at the end of this fact sheet).

Specific information on how to make laboratories accessible is available from the American Chemical Society, the American Association for the Advancement of Science, the Association of Physical Plant Administrators, the National Rehabilitation Information Center, and the Rehabilitation Engineering Society of North America (see the **RESOURCES** section). Coordinate your efforts with those of students, instructors and other support personnel.

FOR EXAMPLE

• David Young, a Ph.D. candidate in physiology at the University of Colorado, stressed, in an American Chemical Society newsletter, the importance of remaining flexible and open-minded in adapting to the conditions of one's disability. For Young, a quadriplegic, a well organized work space is essential. Therefore, his desk is arranged so that telephone, calculator, typewriter and reading materials are within reach of manipulation by use of his mouthstick.

• Dr. Anne Barett Swanson, Associate Professor of Chemistry and Chairperson of the Department of Physical Science at Edgewood College in Madison, Wisconsin, stressed the importance of adjustable height work surfaces. Swanson, disabled by congenital osteogenesis imperfecta ("brittle bones") resulting in short stature, suggested that a lowered work surface may be created by pulling out and turning over a drawer in an existing work bench. Swanson added that safety equipment can readily be made accessible. The pull-chains on drench showers can be lengthened and extension hoses may be attached to eye and face washes. The installation of an extension hose does not require movement of any plumbing fixtures and can be done for about $100.00. Pull-chains may be lengthened for as little as $1.49. Swanson pointed out that these adaptations benefit non-disabled students too, since a person needing to use a drench shower may not have the presence of mind to reach for the end of a pull-chain suspended seven feet above the floor. Contact: Dr. Swanson at Edgewood College, 855 Woodrow St., Madison, WI 57311 (608) 257-4861 x236.

• Ken Fertner, a scientist working at the Franklin Institute in Philadelphia described a recently developed aid called a multimeter for visually impaired people working in the laboratory. A multimeter is a battery-operated, hand-held instrument that measures electricity (volts, current, resistance) and voices the measurement. The multimeter can voice the output of any piece of laboratory equipment that has an electronic (e.g., digital) readout. Thus, the multimeter may be used in conjunction with: voltmeters, spectrometers, thermometers, scales, ph meters etc. (See **DISABILITY-RELATED ACCOMMODATIONS** section for availability of the multimeter.)

• Dr. Dorothy Tombaugh, Traveling Science Consultant, recommended the talking thermometer and the light probe as two of the most important pieces of lab equipment for the visually impaired science student. The talking thermometer consists of a thermometer wired to a voice box worn around the neck. This instrument voices the temperature of any substance into which the thermometer is inserted. The light probe emits a tone that varies in pitch in response to changing light intensity. The light probe has many uses: registering color changes in chemical reactions, comparing the color of plants in a greenhouse, and noting differences in grays on a geology map, to name a few. (See **DISABILITY-RELATED ACCOMMODATIONS** section for availability of the light probe and talking thermometer.)

• Dr. Joseph Larsen, a wheelchair user who is the Director of the School of Life Sciences at the University of

Illinois at Urbana-Champaign, suggested, in an American Association for the Advancement of Science newsletter, that laboratory modifications made to meet the needs of specific disabled individuals provide a better, more efficient approach. Disabilities are too variable for any type of work bench modification to be used by all, he said. Such temporary modifications are disassembled at the end of the term or course.

• At the University of Lowell in Massachusetts, four laboratory benches were constructed by the University's physical plant department according to a prototype designed and suggested to them by disabled science student Gary LeTourneau. The benches can be raised or lowered to suit varying needs and individuals. For more information contact Dr. David Pullen, Physics Department, University of Lowell, 1 University Ave., Lowell, Massachusetts 01854 (617) 452-5000 x2574.

• The Chemistry Department at Brock University, Ontario, Canada. developed a wheelchair with a hydraulic lift for mobility impaired chemistry students. The chair can by maneuvered in raised, lowered or intermediate positions. This permits access to standard chemical bench height experiments, sinks, fume hoods and stationary equipment without moving them. (See the **DISABILITY-RELATED ACCOMMODATIONS** section for availability information.)

• A window washer's belt was the solution developed by one paraplegic science student. The belt is hooked to the work bench and encircles her hips allowing her to stand at the chemistry bench with both hands free to work. This creative, simple and inexpensive solution may suggest similar unique solutions for paraplegics and other mobility impaired people.

• Wayne State University (WSU), in Michigan, is using a portable science station. It has a sink (with push button controls for water), convient electrical outlets, propane burner and fume hood to vent noxious gases. The lab station costs about $5,000. There is an opening wide enough for a wheelchair and can be used from either side. One side is designed for use in biology, the other side for chemistry. Joe Oravec, science lab supervisor at WSU, said that while there are a relatively large number of mobility and or visually impaired students, about 300, that the station has been used by only about six students over the past two years. This is because disabled students have been discouraged in high school from pursuing laboratory science study, he said. Chemistry Department Chairman Dr. Milton Glick said that the lab station has both improved access and raised consciousness. (See the **DISABILITY-RELATED ACCOMMODATIONS** for availability of the portable science lab.)

• Mark Stern, a deaf undergraduate student at Stanford University, has a Superphone, a battery operated telecommunication device (TDD) that allows him to communicate over the telephone lines with faculty, advisors, and friends, and also to access the university computer system for assignments in engineering courses and a part-time job at the Medical Center. Purchase of a TDD that was compatible with the computer network greatly expands the number of individuals and departments with which he can communicate. (See the **DISABILITY-RELATED ACCOMMODATIONS** for availability of TDDs.)

DISABILITY-RELATED ACCOMMODATIONS

Patience, encouragement and open communication can surmount many difficulties. The accommodations below are listed by specific disability, though one aid may work well for several disabilities. However, an aid that works well for one person with a disability may not be suitable for someone else with the same disability. Adaptations are best worked out on an individual basis.

The accommodations listed are followed by sources for further information or specific distributors or manufacturers.

For Hearing Impaired Students

• **Interpreters** (manual or oral)

National Registry of Interpreters for the Deaf, 814 Thayer Avenue, Silver Spring, MD 20910 (301) 588-2406. (The Registry issues regional directories of certified interpreters for $3.00 plus postage each.)

• **Notetakers** (Notetaking can take the form of simply providing the student with copies of another student's notes.)

For information on special notetaking materials see NTID in the **RESOURCES** section.

• **A Telecommunications Device for the Deaf (TDD)**

Ultratec Inc., P.O. Box 4062, Madison, WI 53711, (608) 257-1911.

Information is available in the brochure: "What You Should Know About TDDs" available from the National Technical Institute for the Deaf. (See NTID in the **RESOURCES** section.)

• **Computers** (Computers present no barriers to hearing impaired students and are a positive alternative to conveying information.)

• **Decoders** to receive closed captioning on television.

Sears, Roebuck and Company—contact your local Sears store or National Headquarters: Sears Tower, Chicago, IL 60684 (312) 875-2500.

Telecommunications for the Deaf, Inc. (TDI), 814 Thayer Ave., Silver Spring, MD 20910 (301) 589-3006 (Voice/TDD).

National Captioning Institute, Department K, 5203 Leesburg Pike, Falls Church, VA 22041.

• **Captioned Science Films**

NOVA series: PBS Video, Department C, 475 L'Enfant Plaza, SW, Washington, DC 20024 (800) 424-7963.

Chedd-Angier Production Company, 70 Coolidge Hill Rd., Watertown, MA 02172 (617) 926-8300 Contact: Mary Guest.

• **Written summaries of demonstrations** (Because students can't lipread and watch a demonstration at the same time.)

• **Visual aids** (e.g. an overhead projector so that the instructor can continue to face the class while showing diagrams.)

• **Visual warning signals** (e.g., flashing lights for alarms or timers)

"Signaling Devices for the Hearing Impaired" available from the Alexander Graham Bell Association, 3417 Volta Place, NW, Washington, DC, 20007 (single copies are free).

"Catalogue of Assistive Devices for the Hearing Impaired" available from Mid-Audio Inc., 120 Ogden Ave., Hindsale, IL 60521 (800) 323-6556 Ext. R59, IL Residents: (800) 942-6345 Ext. R59.

- **Lab partner**

For Learning Disabled Students

- **Textbooks on cassette tape.**

Recordings for the Blind, 215 East 58th Street, New York, NY 10022 (800) 221-4792.

- **Location free from distractions** such as a noisy air conditioner or busy hallway.
- **Extra time** to complete examinations and assignments.

For Mobility Impaired Students

- The lab must be in an **accessible building.**

Creating an Accessible Campus (See the Association for Physical Plant Administrators in the **RESOURCES** section.)

- **An adapted lab station** featuring an **adjustable height work bench** and sink that can accommodate a wheelchair. (See the **EXAMPLE** described at University of Lowell.)
- **A portable science station for the physically handicapped**

Conco Industries, Inc., P.O. 150, 30 Water Street, West Haven, CT 06516 (203) 934-5271.

Fisher Scientific Co., 711 Forbes Avenue, Pittsburgh, PA 15219 (412) 562-8300.

- **A rolling laboratory platform** John T. Moore, Waymon Blair, Box 13006, SFA Station, Nacogdoches, TX 75962.
- **An all-terrain vehicle** for fieldwork

For information and a list of distributors: *Sports and Spokes,* Volume 7, Number 6, March/April 1982, "All-Terrain Vehicles" (special section) pp. 11-22. Request reprints from Sports and Spokes, 5201 N. 19th Ave., Phoenix, AZ 85015 (602) 246-9426.

- **Handles, bars and/or handrails** firmly anchored wherever added support is needed

Fred Sammons, Inc., Box 32, Brookfield, IL (write for local distributors).

Lumex, Inc., 100 Spence Street, Bay Shore, NY 11706.

- **A variable-height wheelchair**

For information: Dr. Jack M. Miller, Dr. Mary Richardson, or I. D. Brindle, Chemistry Department, Brock University, St. Catharines, Ontario, Canada L2S 3A1 (416) 688-5550.

Crecco's Mobility Systems for the Handicapped, RR2 Welland, Ontario, Canada L3B 5N5 (416) 892-3519.

Summit Services, 535 Division St., Campbell, CA 95008 (408) 866-1251.

- **Accessible men/women's bathrooms** in the building

Creating An Accessible Campus, pp. 87-92. (See the Association for Physical Plant Administrators in the **RESOURCES** section.)

- **A raised platform with steps and safety rail** so that people of short stature can work comfortably on a standard laboratory bench. (This is a homemade device used by Dr. Anne Swanson. Swanson is listed as a resource person in the **FOR EXAMPLE** section.)
- **Adapted safety equipment** (e.g., extended pull-chain or hose on drench showers; portable, lightweight fire extinguishers.)

For Visually Impaired Students

- **A laboratory assistant or partner** *Teaching Chemistry to Physically Handicapped Students,* pp. 13-14. (See the American Chemical Society in the **RESOURCES** section.)
- **A talking calculator**

Innovative Rehabilitation Technology, Inc., 375 Distel Circle Suite C4, Los Altos, CA 94022 (415) 965-8102.

- **Tactile models** (Home made and commercial models are available for use in biology and geology.)

Journal of College Science Teaching, Volume X, Number 6, May 1981, pages 355-357. (See the National Science Teachers Association in the **RESOURCES** section.)

- **Raised-line drawings** to illustrate material shown on chalkboard, overhead projector or under microscope. *Journal of Chemical Education,* March 1981, p. 223 (See the American Chemical Society in the **RESOURCES** section.); Howe Press, 175, North Beacon St., Watertown, MA 02172 (617) 924-2490.

Braille Materials Production Committee, National Braille Association, Inc., 422 Clinton Ave., South, Rochester, NY 14620 (716) 232-7770.

Recordings for the Blind, 215 East 58th St., New York, NY 10022 (800) 221-4792.

- **Braille, large-letter, raised letter** or otherwise tactile labels

American Printing House for the Blind, Inc., P.O.B 6085, Louisville, KY 40206-0085 (502) 895-2405.

Braille Materials Production Committee, National Braille Association, Inc., 422 Clinton Ave., South, Rochester, NY 14620 (716) 232-7770.

- **A talking thermometer**

American Foundation for the Blind (See AFB in the **RESOURCES** section.)

- **A thermometer with a raised dot scale**

Science for the Blind Products (See SBP in the **RESOURCES** section.)

- **A light probe**

San Francisco Lighthouse for the Blind, 745 Buchanan St., San Francisco, CA 94102 (415) 431-1481.

Science for the Blind Products (See SBP in the **RESOURCES** section.)

American Printing House for the Blind, Inc., P.O.B 6085, Louisville, KY 40206-0085 (502) 895-2405.

- **Emphasis on verbal description**
- **Audio warning signals** (*e.g.,* liquid level indicators)

Science for the Blind Products (See SBP in the **RESOURCES** section.)

- **A talking digital multimeter**

Science for the Blind Products (See SBP in the **RESOURCES** section.)

- **Projection of photomicrographic slides** on a wall, a screen **or a television** for partially sighted students
- **Talking clocks for timing devices**

American Foundation for the Blind (See AFB in the **RESOURCES** section.)

Science for the Blind Products (See SBP in the **RESOURCES** section.)

- **Clear aisles and work areas**
- **Talking computer terminals and braille printers**

Maryland Computer Services, 2010 Rock Springs Road, Forest Hill, MD 21050 (301) 879-3366.

Triformation Systems, Inc., 3132 S.E. Jay St., Stuart, FL 33497 (305) 283-4817.

• **Software to adapt APPLE II computers for the visually impaired**
David Holiday, Raised Dot Computing, 310 South 7th St., Lewisburg, PA 17837 (717) 523-6737. (David Holiday has developed a program that will directly translate numbers entered in braille code to printed numerals.)

For Vocally and Speech Impaired Students

• **A reader** (i.e. if the student uses a manual communications board).
• **A device with a keyboard that "speaks" or prints out what is typed.**

RESOURCES

To use this resource list effectively, write or telephone the organizations below with a specific question or questions. If you ask for everything they have, you are likely to receive reams of unwanted material. However, if you are a professional in the field seeking to build your own resource library such a request may be appropriate. In any case, it is critical that you assess your own needs and make your request as specific as possible.

In addition to the following resources, there are dozens of excellent articles concerning accessibility to the science classroom and laboratory. *Science for the Handicapped: An Annotated Bibliography* (Listed under **The National Science Teacher's Association**) is a source of articles written through 1980. To learn of more recent articles NSTA will provide an updated supplement. If you are using the library, suggested search terms include: Deaf, Hearing Impaired, Blind, Visually Impaired, Mobility Impaired, Physically Handicapped, Science, Laboratory.

Accent on Living, P.O. Box 700, Gillum Road and High Drive, Bloomington, IL 61701 (309) 378-2961.
ACCENT on Living, published and edited by Ray Cheever, is a quarterly publication ($5.00/year) which focuses on the needs of people with handicaps. Articles cover organizations, new products and inventions for the disabled, ideas for recreation and daily living. Also available is the Buyer's Guide 1982-83 edition, ($10.65), a 128 page sourcebook on products and services. They also have a computerized retrieval system for specific products or services. Write or call for cost and publications list.

Accomodating the Disabled Student, James Mueller, $10.00, available from Rehabilitation, Research and Training Center, George Washington University, 2300 Eye Street, NW, Suite 714, Washington, DC 20037 (202) 676-3801.
This publication illustrates how educational facilities can be designed or adapted to accommodate disabled students. Specifically, this publication focuses on the laboratory, the studio, the auditorium and the library. Through illustrations the author diagrams the accommodations that can be made for a variety of limitations due to disability.

Adapting Work Sites for People with Disabilities: Ideas from Sweden (World Rehabilitation Fund, Inc. Monograph #20). Available from the National Rehabilitation Center (See NARIC in this section).
Included in this handbook are specific physical plant adaptations as well as descriptions (accompanied by pictures) of a variety of adapted work sites for workers with various disabilities. (Cost includes postage and handling only.)

American Association for the Advancement of Science (AAAS), Project on the Handicapped in Science, 1776 Massachusetts Avenue, NW, Washington, DC 20036 (202) 467-4496 (Voice/TDD).
The Project on the Handicapped in Science is a national center for the concerns of handicapped persons in science. The office focuses attention on the need for improved science career information and education for physically handicapped youth. Publications of the Project include:
Resource Directory of Handicapped Scientists, Editors: Janette Alsford Owens, Martha Ross Redden and Janet Welsh Brown, 1978 (update currently in process) Available free through AAAS while the supply lasts. This directory lists biodata on scientists with mobility, neurological, hearing, and visual impairments. These scientists have identified themselves as advisors to disabled science students and consultants on a variety of subjects including laboratory accessibility.

Science for Handicapped Students in Higher Education, Martha Ross Redden, Cheryl Arlene Davis, Janet Welsh Brown, 1978. Available free through AAAS while the supply lasts. This monograph reports on the physical, attitudinal, informational, financial, and academic barriers which hinder the participation of handicapped students in the sciences as well as strategies for removing the barriers. The report also includes recommendations for institutional changes.
Scientific and Engineering Societies: Resources for Career Planning, Editors: Virginia Stern and Martha Ross Redden, 1980. This publication offers counselors and students an overview of the wide range of career possibilities and the level of education required in science and engineering based on information provided by 82 professional societies. To order prepay $6.00 to AAAS Sales Department, 1500 Massachusetts Avenue, NW, Washington, DC 20005.

American Association of Colleges for Teacher Education, Suite 610, One Dupont Circle, Washington, DC 20036 (202) 293-2450.
AACTE has produced *Educators with Disabilities: A Resource Guide.* This publication includes a nationwide directory of over 900 handicapped educators and the results of a year's study of the experiences of disabled educators in being trained, certified, and employed as education professionals. Copies of this publication are free from the HEATH Resource Center, One Dupont Circle, Washington, DC 20036 (202) 833-4707.

American Chemical Society, 1155 16th Street NW, Washington, DC 20036 (202) 872-8733 (Voice/TDD).
The Society's Committee on the Handicapped has published a manual entitled *Teaching Chemistry to Physically Handicapped Students,* Editor: Kenneth M. Reese, 1981 (free). This booklet offers suggestions and recommendations for making the chemistry classroom and laboratory accessible to disabled students. The manual also includes a section on laboratory safety, testing and evaluation and Sources of Information. For more information or copies of the manual contact Janet

Boese, Education Division (202) 872-4380.

Chemical Health and Safety Referral Service is for inquirers concerned with chemical health and safety questions. Resources for referral include books, periodical articles, films, educational programs and government agencies and other organizations oriented to health and safety matters. The service is available by telephone at (202) 872-4511.

Journal of Chemical Education, Volume 58, Number 3, March 1981. This special issue includes the following articles: "Attitudinal Barriers for the Physically Handicapped," "Chemistry and the Visually Handicapped," "Chemistry and the Hearing Impaired," "Mobility-Handicapped Individuals in the College Chemistry Curriculum: Students, Teachers and Researchers," "A Rolling Laboratory Platform for the Mobility Impaired," "Chemistry and the Visually Impaired: Available Teaching Aids," "Teaching Aids for Visually Handicapped Students in Introductory Chemistry Courses," "High Technology Laboratory Aids for Visually Handicapped Chemistry Students," "Laboratory Instruction for the Motor Impaired," "Safety Considerations for Physically Handicapped Individuals in the Chemistry Laboratory," and the editorial, "Chemistry and the Disabled Student."

The Filter Paper, Volume 14, Number 1, Fall 1981. Although out of print, a copy of this edition of ACS's student affiliate newsletter should be available in college and university chemistry department libraries. This newsletter focuses on Education in Chemistry for the Handicapped. Following an introduction describing the ACS committment to assist physically handicapped students in chemistry, there are three biographical sketches of disabled scientists. In addition, Anne Swanson, a disabled professor of chemistry, explains the responsibilities and goals of the ACS Committee on the Handicapped.

American Foundation for the Blind, 15 West 16th Street, New York, NY 10011 (212) 620-2171.

The Foundation supplies a free catalogue, *Products for People With Vision Problems,* 1982-83 (free). Some items available through AFB are a talking thermometer, a talking micrometer, a talking Vernier caliper. To order the catalogue call or write the Consumer Products Department.

American Psychological Association, 1200 17th St., NW, Washington, DC 20036 (202) 833-7572; contact: Dr. Arnold S. Kahn.

APA sponsors a Task Force on Psychology and the Handicapped. The Task Force has set up a network of psychologists who are handicapped and those who work with handicapped persons to serve as resources and role models.

Assistive Device Center, School of Engineering, California State University, 6000 J. Street, Sacramento, California 95819 (916) 454-6422, Dr. Albert Cook, Director; Helen Woodall, Resource Coordinator.

The Assistive Device Center has established a data base consisting of information on assistive devices, bibliographic references, service agencies, and resource persons for disabled students in science and engineering.

Association on Handicapped Student Services Programs in Postsecondary Education (AHSSPPE), Executive Director, Jane Jarrow, P.O. Box 21191, Columbus, OH 43221 (614) 457-5681.

AHSSPPE is an association of leaders in the field of providing services to disabled students on college campuses. Information sharing is a key element of their goal which is to upgrade the quality of services available to disabled students. Membership fee is based on a sliding scale and includes the newsletter, ALERT.

Association of Physical Plant Administrators, 11 Dupont Circle, Suite 250, Washington, DC 20036 (202) 234-1662.

APPA offers technical assistance to schools that are making their physical plant more accessible to persons with disabilities. Among their publications is *Creating An Accessible Campus,* 1978 ($12.50, members; $17.50, nonmembers), Editors: Maggie Coons and Margaret Milner. This book includes the chapter, "The Handicapped Student in the Science Laboratory" by Robert P. Larsen, Richard Buchanan and Frank P. Torrey. Descriptions of laboratory accommodations and safety considerations are the major focuses.

Center for Multisensory Learning, Dr. Herbert D. Thier, Director, Lawrence Hall of Science, University of California, Berkeley, CA 94720 (415) 642-3679.

This organization has developed hands-on science materials for multisensory science experiences for physically disabled children, including Science Activities for the Visually Impaired and Science Enrichment for Learners with Physical Handicaps (SAVI/SELPH). For more information contact Coordinators Linda DeLucchi or Larry Malone.

Committee on Personal Computers and the Handicapped (COPH-2), 2030 Irving Park Road, Chicago, IL 60618 (312) 477-1813.

COPH-2 is a consumer organization whose purpose is to search out, evaluate, and share information about personal computers that is relevant to persons with disabilities. Annual membership fee is $8.00 which includes, among other services, a quarterly newsletter, a directory of persons with computers who are willing to share information (Enter-Act), computer loans, and technical assistance for blind and other disabled persons.

"Cost Effective Ideas" by Susan Bardellini Forman, Rhona C. Hartman, and Michael Zimmerman, February 1983, Available from the HEATH Resource Center, One Dupont Circle, Washington, DC 20036 (202) 833-4707.

This fact sheet identifies long range planning strategies, suggests specific questions to ask prior to initiating a program or purchasing equipment and pinpoints a number of cost effective ideas now in use on American Campuses.

"Fire Safety for Hearing-Impaired People", The Environmental Design Center for the Deaf, Gallaudet College, 7th and Florida Avenue, NE, Washington, DC 20002 (202) 651-5218 (Voice/TDD).

This brochure describes the fire safety prevention and control program, the emergency signals used and the evacuation procedures established at Gallaudet College. The brochure is available free from the above address and telephone number.

Foundation for Science and the Handicapped (FSH), 154 Juliet Court, Clarendon Hills, Illinois 60514; Dr. Phyllis Stearner, Treasurer.

FSH is an organization of handicapped scientists which functions as a resource and advocacy group promoting access to science education and employment for the handicapped. FSH publishes a periodic newsletter and awards several scholarships to disabled science students in college.

Gallaudet College Press, Distribution Office, 7th Street and Florida Avenue, NE, Washington, DC 20002 (202) 651-5591 (Voice), 651-5355 (TDD).

The Gallaudet College Press has available *The Deaf Student in College* ($1.50 for single copies; $.75 each for two to nine copies; $.50 each for 10 or more), a two booklet portfolio which outlines how to meet the needs of deaf students in mainstreamed settings. It also describes over sixty programs for deaf students currently available on campuses across the country.

"Measuring Student Progress in the Classroom," by Rhona Hartman and Martha Redden, June 1982. Available from the HEATH Resource Center, One Dupont Circle, Washington, DC 20036 (202) 833-4707.

This fact sheet is a guide to testing and evaluating progress of students with disabilities. Included are considerations in testing disabled students, functional limitations, examination adaptations, as well as selected publication and resource persons identified through Project HEATH.

National Federation of the Blind, 1800 Johnson Street, Baltimore, MD 21230 (301) 659-9314.

NFB publishes *Postsecondary Education and Career Development - A Resource Guide for the Blind, Visually Impaired, and Physically Handicapped.* This publication contains advice on notetaking, testing options, procedures for making campus contacts and places where texts can be transcribed and materials of any sort can be located around the country. This publication can be ordered from the above address by prepaying $4.95.

National Rehabilitation Information Center (NARIC), 4407 8th Street, NE, The Catholic University of America, Washington, DC 20017-2299 (202) 635-5826 (Voice), 635-5884 (TDD).

NARIC is a rehabilitation information resource library housing research reports, books, microfiche, and audio-visual materials relevant to the rehabilitation profession. The Center supplies bibliographic citations of documents in its collection and performs on-line searches of any rehabilitation subject area requested. Also available is the national computerized data bank (ABLEDATA) which contains a listing of over 6000 rehabilitation products and devices and their manufacturers by type of product. Contact the Center Information Specialist for cost guidelines.

National Science Teachers Association, 1742 Connecticut Ave., NW, Washington, DC 20009 (202) 328-5800; contact: Dr. Helenmarie Hofman.

Science for the Handicapped Association (SHA) c/o Ben Thompson, UWEC—B272, Eau Claire, Wisconsin 54701 (715) 836-4164; Dr. Ben Thompson Secretary/Treasurer. SHA promotes science for all handicapped children and youth. The Association publishes a newsletter containing bibliographic citations on science for the handicapped as well as descriptions of current research, conferences, and courses. SHA will supply an updated bibliography for $.50 if requested. SHA requests a donation of $5.00 annual dues.

Sourcebook: Science Education and the Physically Handicapped, 1979, Editors: Helenmarie H. Hofman, Ph.D. and Kenneth S. Ricker, Ed.D., National Science Teachers Association, 1742 Connecticut Avenue, NW, Washington, DC 20009 (202) 328-5800 ($9.00 plus postage and handling). This publication consists of a collection of papers and articles covering the following general areas: "Science Education and the Handicapped," "Science for Everyone," "Preparing Teachers to Work with the Handicapped," "Resources for Teachers/Schools," "Science and the Orthopedic Handicapped," "Science and the Visually Handicapped," "Extending the Science Program Beyond the School," "The Handicapped and Careers in Science and Related Fields," and "Science Education and the Handicapped: Implications for the Future."

Journal of College Science Teaching, Volume X, Number 6, May 1980, The National Science Teachers Association, 1742 Connecticut Avenue, NW, Washington, DC 20009. This issue of the Journal includes the following chapters "Overview of the National Science Foundation Project on the Handicapped in Science," "Teaching Biology to Visually Handicapped Students," "The Physically Handicapped Student in Biology," "The Mobility-Handicapped Student in the Science Laboratory," "Teaching Chemistry to the Hearing Impaired," "Research Exposure for Physically Handicapped Science Students: An Educational Program in a Research Setting," "A Variable Height Wheelchair," and an editorial, "Assuring Access to Handicapped Students—Whose Responsibility?"

National Technical Institute for the Deaf, Rochester Institute of Technology, 1 Lomb Memorial Drive, Rochester, NY 14623 (716) 475-6748 (Voice/TDD).

NTID provides support services to hearing impaired students attending Rochester Institute of Technology. NTID serves as a resource to other educational institutions involved in mainstreaming deaf people into regular classes. NTID conducts training programs for interpreters, notetakers, and tutors and can advise other colleges on setting up similar programs. In addition, NTID has a free Resource Catalogue and a video tape on technical signs related to the sciences.

National Center on Employment of the Deaf Career Matching System accepts resumes and educational transcripts from deaf people for automated processing and matching with job requirement information furnished by prospective employers. This service may also be used by placement personnel and vocational rehabilitation counselors for the deaf. Contact Colleen Foote, Career Matching Specialist. (716) 475-6710 (Voice) 475-6834 (TDD).

Rehabilitation Engineering Society of North America (RESNA), Suite 402, 4405 East-West Highway, Bethesda, MD 20814 (301) 657-4142 Pat Horner, Executive Director.

This organization can respond by mail to specific questions about modifying existing equipment and desgning new devices. The Executive Director reads the letters of inquiry and forwards them to the board member with appropriate expertise.

Resource Book: Teaching the Physically Disabled in the Mainstream Science Class at the Secondary and College Levels, E.C. Keller, Jr., T.K. Pauley, E. Starcher, M. Ellsworth, B. Proctor (1983). Available for $6.50 (postpaid) from Printech, 1125 University Ave., Morgantown, WV 26505 (304) 296-0078.

This book is directed toward the science teacher with one or more physically disabled students. Included are definitions and implications of hearing impairments, visual impairmen^s and motor/orthopedic impairments. General teaching strategies are presented and specific strategies and assistive devices are listed by disability and teaching method. An actual thermoform insert is included.

Science for the Blind Products, Dr. and Mrs. Tom Benham, Box 385, Wayne, PA 19087 (215) 687-3731.

SPB has available a variety of products and devices for blind scientists. For a catalogue write or call.

Science for the Handicapped: An Annotated Bibliography, 1980, Editor: Ben Thompson, Available from ERIC Clearinghouse for Science, Mathematics, and Environmental Education, Information Reference Center, Ohio State University, 1200 Chambers Road, Third Floor, Columbus, Ohio 43212 ($3.50).

This extensive bibliography is divided into General and Research sections related to Visually Impaired, Hearing Impaired and Other Handicapping Conditions.

Signs for Computing Terminology, 1983, Steven Jamison. Available from the National Association of the Deaf, 814 Thayer Ave., Silver Spring, MD 20910 (301) 587-6282.

This book diagrams those signs related to computer science. There are also three video tapes (one hour each) which follow the book. The book will be available in Fall 1983 (price to be determined). The video tapes are available now for $125 each.

Special Materials Project - Captioned Films for the Deaf and Handicapped Learners Materials, 814 Thayer Avenue, Silver Spring, MD 20910 (301) 587-5940 (Voice/TDD).

SMP distributes captioned films: both educational (requires at least one hearing impaired *student*) and theatrical (requires at least six hearing impaired individuals—no hearing individuals). There are films of science content, although most are at the primary and secondary level. Write or call for account application and additional information.

Testing Physically Handicapped Students in Science: A Sourcebook for Teachers, 1981, Editor: Harry G. Lang. Available from Printech, 1125 University Ave., Morgantown, WV 26505 (304) 296-0078.

This publication provides suggestions and recommendations for the development of teacher made achievement tests in science for students with visual, hearing and/or orthopedic impairments. Contact Printech for price information.

This fact sheet was prepared by Michael Zimmerman, HEATH Resource Center and Martha Ross Redden, Director of the Project on the Handicapped in Science, American Association for the Advancement of Science and Consultant to the HEATH Resource Center with the assistance of Susan Bardellini Forman, Research Assistant, AAAS. June 1983.

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